SHARP OPTONICA SERVICE MANUAL

MODEL SM-3000H

"In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used."

SPECIFICATIONS

GENERAL

Power source ..... AC 110/220/240V, 50/60Hz
Power consumption 270W
Semiconductors ..... 1-IC (Integrated circuit), 47-Transistors, 24-Diodes, 1-LED
Dimensions ..... 442(W) x 144(H) x 380(D) mm
Weight ..... 14.5 kg

MAIN AMPLIFIER

Circuit ..... Two-step differential amplifier, pure complementary system, OCL (Output Condenser-Less)
Continuous power output
2 x 50W/4-ohms ..... Both channels drive, at 1kHz
2 x 35W/8-ohms ..... Both channels drive, at 1kHz
Total harmonic distortion ..... 0.02% at 25W
Intermodulation distortion ..... 0.05% at 25W
Damping factor ..... More than 25 (at 1kHz , 4-ohms)
Power band width ..... 7Hz ~ 70kHz at 0.3% distortion, 25W
Frequency response ..... 15Hz ~ 90kHz (±1.5dB)
Input sensitivity and input impedance ..... 800mV/50k ohms

PRE AMPLIFIER

Circuit ..... Three-step direct coupled equalizer circuit whose first step serves as differential amplifier.
Type "NF" tone control circuit.

Input sensitivity and input impedance
PHONO 1 ..... 2.5mV, 5mV/47k ohms
PHONO 2 ..... 2.5mV/22k ohms, 47k ohms, 100k ohms
AUX 1 and 2 ..... 150mV/47k ohms
TAPE PLAYBACK 1 and 2 ..... 150mV/47k ohms
TAPE PLAYBACK 1 and 2 (DIN socket) 1 and 2 ..... 150mV/47k ohms
Output level and loaded impedance
REC 1 and 2 ..... 150mV/47k ohms
REC 1 and 2 (DIN socket) ..... 30mV/80k ohms
Max. allowable input for PHONO ..... 300mV(RMS, 1kHz)
850mV(P-P, 1kHz)
Deflection of "RIAA" curve for equalizer circuit from standard "RIAA" curve ..... ±0.3dB
Frequency response ..... 15Hz ~ 90kHz (TUNER, AUX, TAPE PLAYBACK)
Tone control
Bass ..... ±10dB at 100Hz, turnover 600Hz
±10dB at 60Hz, turnover 300Hz
Treble ..... ±9dB at 10kHz, turnover 1.5kHz
±9dB at 20kHz, turnover 3kHz
Filter
Low cut 30Hz, 12dB/oct
High cut 7kHz, 6dB/oct

SHARP CORPORATION OSAKA, JAPAN

CABINET TOP REMOVAL (Refer to Figure 1)

① Remove 8 screws attached to washer located at side decoration panel of cabinet.
② Remove 2 screws attached to washer of CABINET TOP.
③ Gently lift up the CABINET TOP.

OPERATION PLATE REMOVAL (Refer to Figure 1)

④ Remove all knobs provided at the OPERATION PLATE.
⑤ Remove 6 screws located at OPERATION PLATE.

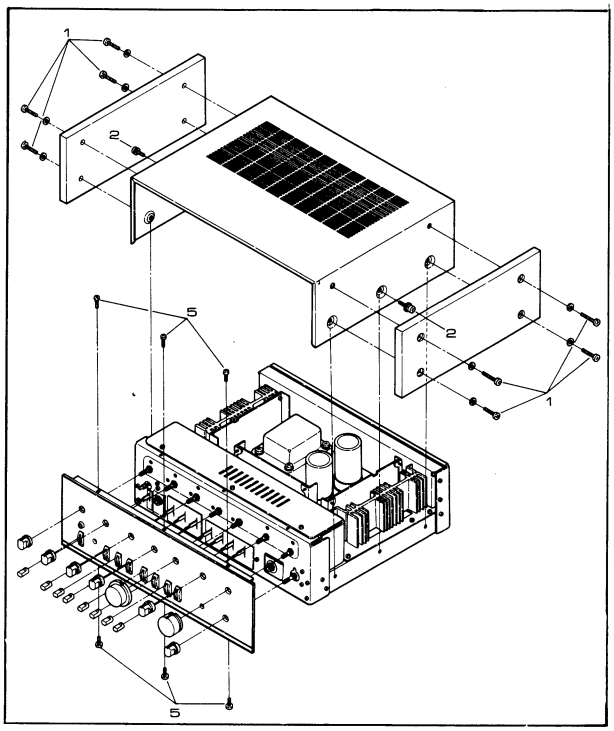


Figure 1

BOTTOM PLATE REMOVAL (Refer to Figure 2)

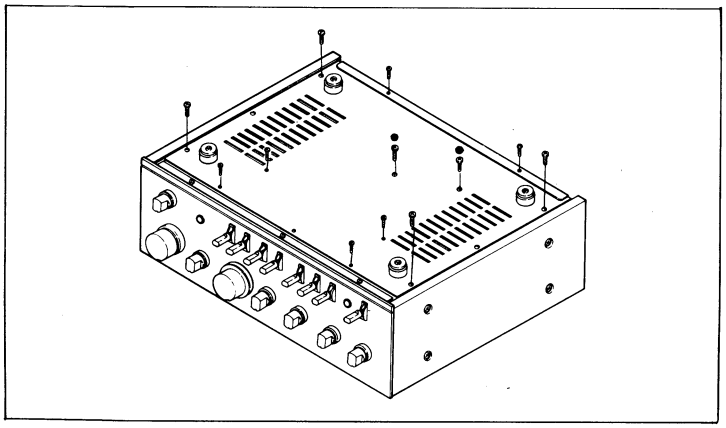


Figure 2

Remove 12 screw of CABINET BOTTOM

Caution: These (●) mark of two screws are 4ϕ x 8 mm.
Another ten screws are 3ϕ x 6 mm.

PREPARATION FOR USE

MAINS VOLTAGE SELECTION (Refer to Figure 3)

Be sure to check the pre-set voltage selector before operating the set. If the voltage is different from your local voltage, change it in the following manner:

1. Loosen a screw and slide the cover as illustrated in Figure 3.
2. Put a fuse in the fuse holder which has an indication of your local voltage.

Note:

In case the local voltage is 110V, two pieces of fuses should be used.

3. Replace the cover in its original position.

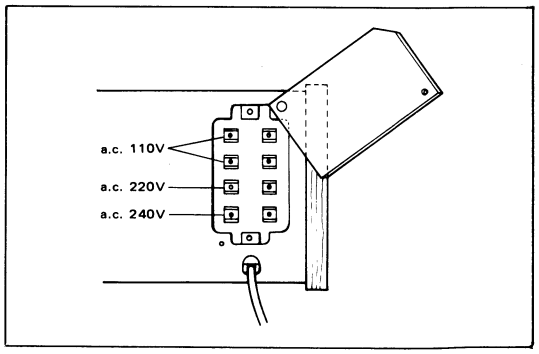


Figure 3

CIRCUIT DESCRIPTION

EQUALIZER AMPLIFIER

The equalizer circuit is driven by three kinds of power sources. The transistor at the final stage is given a high voltage of 70V to assure the amplifier of satisfactory dynamic range.
The equalizer circuit consists of high-precision parts (resistor, capacitor etc.) so that RIAA diviation is limited to the maximum (within ±0.3dB) and the impedance of RIAA elements is kept high to suppress possible distortion at the high frequency band.

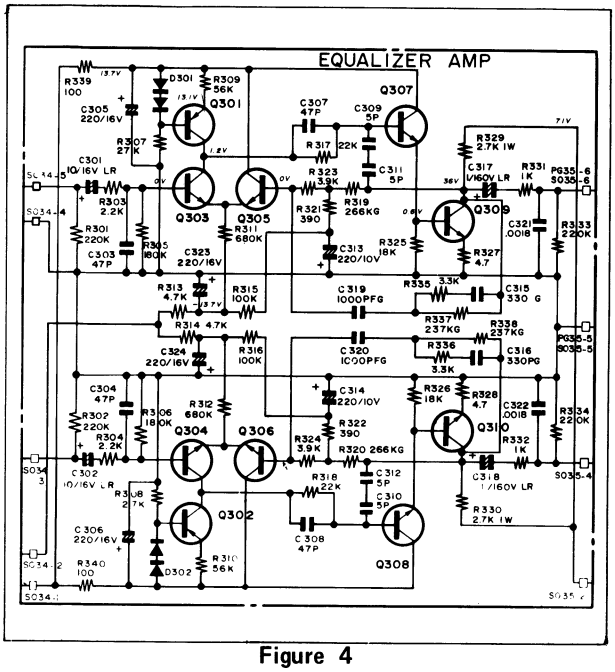


Figure 4

CIRCUIT DESCRIPTION

Passing through C301 and R303, the output of cartridge enters the differential amplifier consisting of Q303 and Q305 (Low Noise Transistor). Q301 and D301 is constant-current circuit and serves as load for Q303.

The output of Q303 enters Q307 (Emitter Follower Circuit) via R317. (C309 and C311 located at the base circuit of Q307 is high frequency oscillation proventive circuit). The output of Q307 is amplified by Q309 (Class "A" Amplifier). The gain of equalizer circuit mostly depends upon Q309.

Since RIAA characteristic is determined by C315, R335, R337 and C319 (Negative Feedback Circuit), these parts should be qualified ones.

Notes: R333.... It serves to make easier the discharge of C317 and also to restrict shock noise caused when the function switch is operated.

C303.... It serves to prevent SW broardcasts etc. from mixing in the unit (this is caused due to high gain of equalizer circuit).

TONE AMPLIFIER

The tone circuit makes use of the high gain of IC (Integrated Circuit) which incorporates differential one-stage directcoupled three-stage circuit, in order to lower the distortion factor.

There are two kinds of power source to drive the tone circuit and the potential of input/output part is kept zero. The capacitor used for the input/output part is low leak type to reduce residual noise.

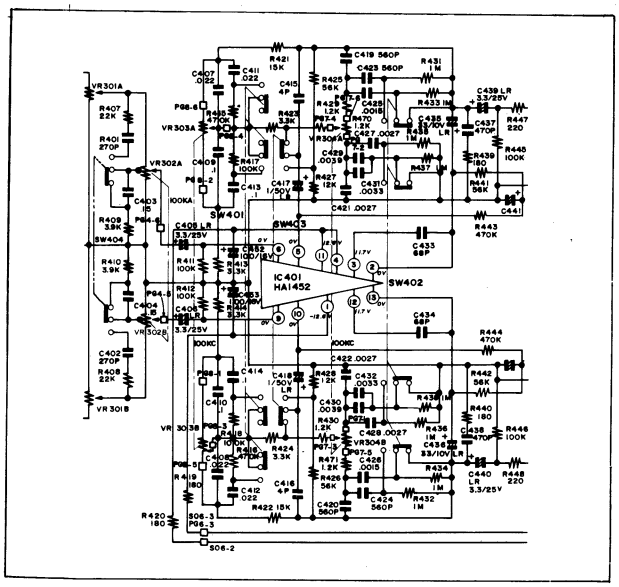


Figure 5

CIRCUIT DESCRIPTION

After being controlled by the volume control (VR302), the signal enters the terminal 6 of IC401 via C405. The signal amplified by IC401 comes out of the terminal 2 and enters the filter circuit via C439.

The negative feedback circuit consists of the parts of tone circuit. Tone control of low or high frequency band is made by varying NF amount by the variable resistor (VR303, VR304).

Frequency turnover is made by the switches (SW401; low frequency band, SW402; high frequency band) to vary the capacitance of capacitor. The variable/defeat circuit consists of the switch (SW403) that switches over the tone control NF circuit and NF circuit having a flat frequency characteristic.

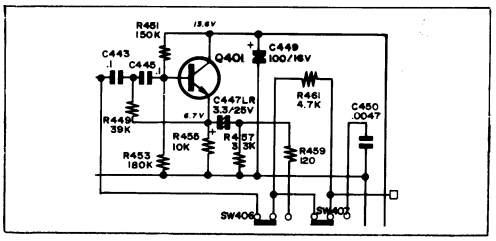


Figure 6

FILTER CIRCUIT

There are two type of filter circuit, one; 7kHz, –6 dB/oct. and another; 30 Hz, –12 dB/oct.

CIRCUIT DESCRIPTION

The high cut filter consists of R461 and C450, and the cutoff frequency is 7 kHz and the attenuation, 6 dB/oct. The low cut filter is a filter of NF (including C443 and R449) type making use of the emitter follower, and the cutoff frequency is 30 Hz and the attenuation 12 dB/oct.

MAIN AMPLIFIER

The main amplifier consists of all-stage direct-coupled pure complementary output capacitorless circuit.

FEATURE OF PURE COMPLEMENTARY OCL CIRCUIT

Since this circuit is not using output capacitor, the frequency characteristic is kept uniform even at very low frequency band and the output impedance is low in any of frequency bands resulting in that the value of damping factor is made larger so that the braking efficiency of speaker is increased. With this circuit, since a 100 percent NF is assured when the frequency of signal is zero and the value of NF is determined at only one place when the frequency of signal is at low band, the function of circuit is stabilized.

CIRCUIT DESCRIPTION

The main amplifier is OCL circuit in which the class "A" drive circuit consists of 2 stage differential amplifier circuit.
The signal coming from the filter circuit is amplified by differential amplifier (Q502, Q503) via R502 and C504.
Since this differential amplifier consists of PNP type low noise transistor (2SA836D), a high value of S/N ratio is assured. And this amplifier functions to keep zero the center voltage (speaker terminal voltage) as well as to amplify signals. The zero adjustment of potential is to be made by using semi-variable resistor (VR501). Signal thus amplified by the differential amplifier is further amplified by differential amplifier (Q504 and Q505). Moreover, the signal is amplified for the half cycle at the driver amplifier stage consisting of Q510 (NPN type transistor) and Q511 (PNP type transistor). Then, the signal is further amplified for the half cycle at Q901 (NPN type transistor) and Q902 (PNP type transistor) to be supplied to the speaker. Q501 and Q506 is constant-current circuit and its amperage is determined by D501. Q501 functions to protect the differential amplifier (Q502 and Q503) against fluctuations of temperature and voltage resulting in that the center voltage (speaker terminal voltage) is kept constant. Q506 is constant-current circuit to supply constant current so that the load applied to the class "A" driver Q505 will be reduced thus the gain being increased. As a result of the gain of Q505 being increased by Q506, plenty of NF is produced and so the distortion is lessened. NF factor of NF circuit is determined by R520 and R517, and the higher NF factor, the higher is the gain. NF factor at the low frequency band is determined by C511 and R517. Q507 and D506 are to cause the bias of class "B" drive stage and to produce idling current of 30 ~ 80 mA so that cross-over distortion due to class "B" operation is eliminated. The idling current is to be adjusted by semi-variable resistor (VR502). Q508, Q509, D502 and D503 are short circuit, etc. at the output section and they detect voltage which will be caused at R528 and R531 (emitter resistor) if current runs excessibely – if the detected voltage is higher than as rated, the collector-emitter of Q508(Q509) becomes conductive. D502(D503) and Q508(Q509) are being located between the base of Q510(Q511) and the center (speaker output) and serve as constant-current circuit, and this results in that the power transistor (Q901, Q902) is assured of a rating current.

SLAD (Spike-less Amplifier Design) CIRCUIT

This circuit is a unique circuit out of those in this unit and it actually consists of D504, D505, R527 and R529.
In the case of power transistor of class "B" amplifier operation, the most part of input signal is cut off for the half cycle and there arises charge or discharge at the junction according to its capacitance. Therefore, spike-like voltage is generated or the switching time is disordered against the high frequency signal resulting in that cross-distortion of high frequency band is enlarged.
SLAD circuit is for the purpose to prevent such phenomenon as above.

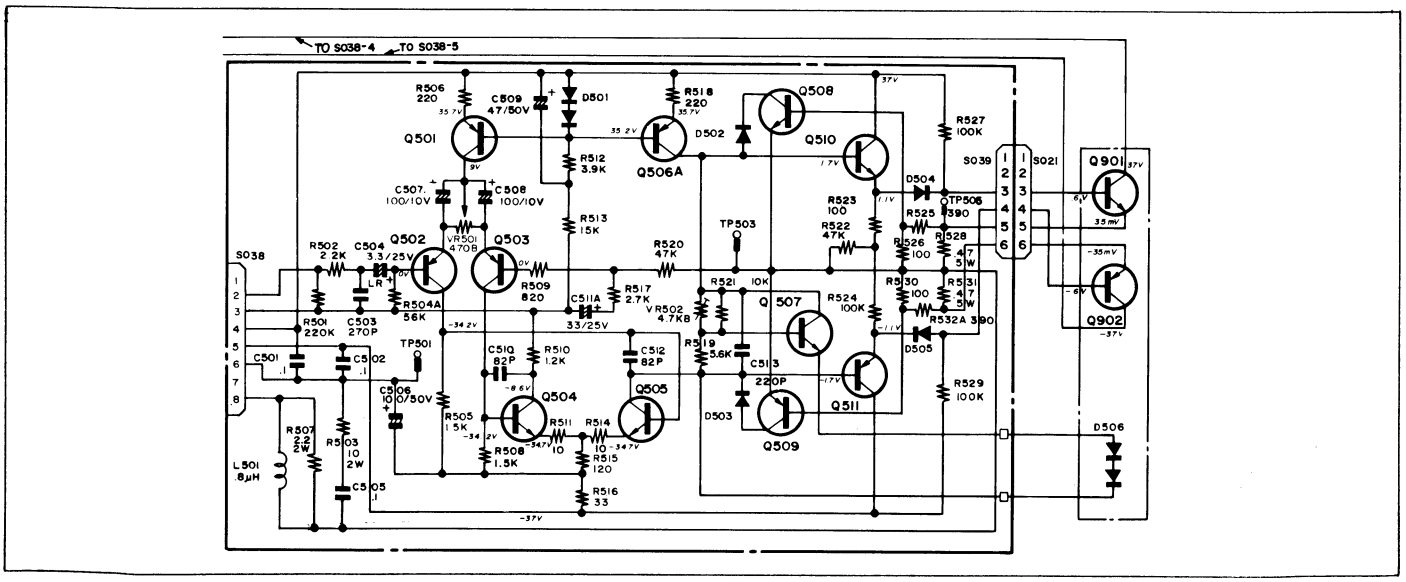


Figure 7

PROTECTIVE CIRCUIT (Relay Circuit)

This circuit is a speaker protection circuit displaying three functions as follows.

CIRCUIT DESCRIPTION

1. If DC voltage is produced at the speaker terminal, is enters to the base of Q801 via R813 and R814. When DC voltage is positive, Q801 becomes conductive and when it is negative, Q802 becomes conductive. As a result, a current runs in R807 and the base voltage of Q804 is decreased so that Q804 becomes conductive. Then the base voltage of Q805 is increased and Q805 loses its conductivity, resulting in that no current runs in the relay. With no current running in the relay, the relay switch is put in "OFF" mode, thus no current running in the speaker.
2. When the power switch is set to "ON", voltage is applied to the base of Q804. Since this base voltage is made lower when C805 is being charged, no current runs in the relay and the relay switch is put in "OFF" mode (no current runs in the speaker). The duration of charging is determined by the values of C805, R807, R808 and R809.
3. The base of Q803 is given positive voltage by R802 and negative voltage by D801 and R801 as a result of which the base voltage is made to be −3.5V. When the power switch is set to "OFF", since positive capacitance is larger than negative capacitance, the positive voltage is maintained for a while. Thus, the base voltage of Q803 is gradually increased from negative (−3.5V) to positive, Q803 is made conductive, the base voltage of Q804 is decreased, no current runs in the relay to put the relay switch in "OFF" mode and thus the speaker is cut off. It takes about one second for the speaker to be cut off after the power switch is turned off.

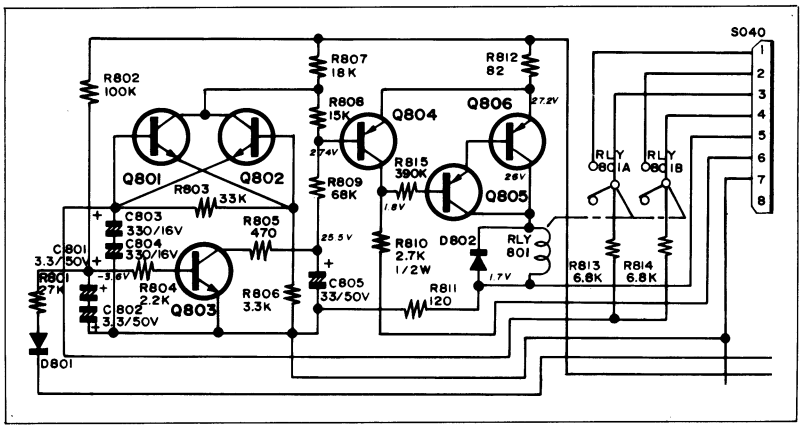


Figure 8

AF ALIGNMENT

PROCEDURE NUMBER	Alignment	Meter	Output Indicator	Setting	Adjustment	Remarks
1	Output DC Voltage (Offset Voltage)	100mV DC Voltmeter	Voltmeter is connected between speaker terminal and ground	Volume is minimum position. Other knobs are in normal position	VR501A VR501B	0 V
2	Idle Current	100mV DC Voltmeter	Voltmeter is connected between Emitter of Q901 ~ Q904 and speaker terminal	Volume is minimum position. Other knobs are in normal position	VR502A VR502B	35mV

POWER TRANSISTOR REPLACEMENT

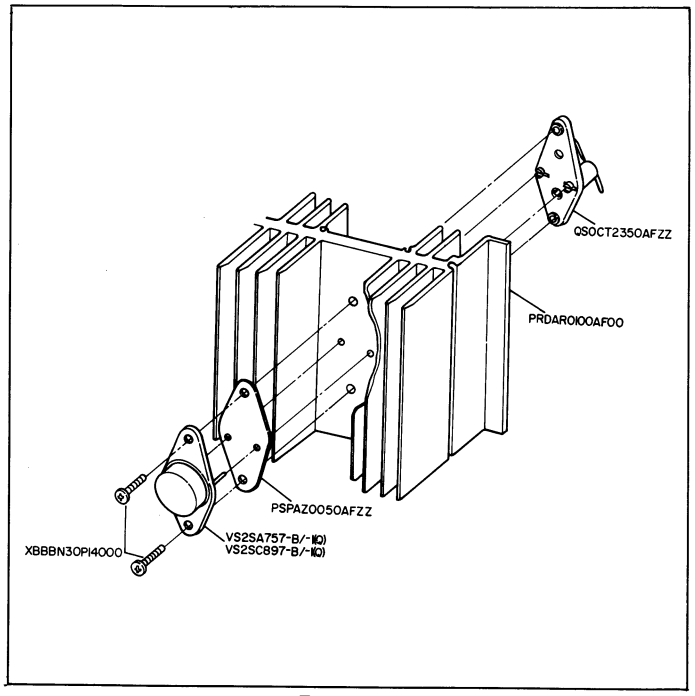


Figure 9

If it is necessary to replace audio output transistors, then follow these procedures to prevent reoccurrence of transistor failure.

1. Carefully remove transistor and mica isolator and clean all the silicone grease off the mica and the mounting area on the chassis. If the mica is damaged, then it must be replaced.
2. Remove the defective transistor and clean out the transistor mounting hole.
3. Put new silicone grease on the transistor mounting area of the chassis and on both side of the mica isolator. Mount the new transistor, being careful to tighten each transistor mounting screw evenly.
   Driving one screw tightly and then the other is likely-to-cause metal filings which may damage the mica or prevent necessary heat dissipation on chassis.
4. Before applying power to the new transistor, with an ohmmeter check to see that there is no short between the transistor case and chassis.
5. As transistor VS2SA757-B/-1 and VS2SC897-B/-1 are almost similar in the shape. So pay attention to the mark of transistor when replacing the power transistor.

RIPPLE FILTER TRANSISTOR REPLACEMENT

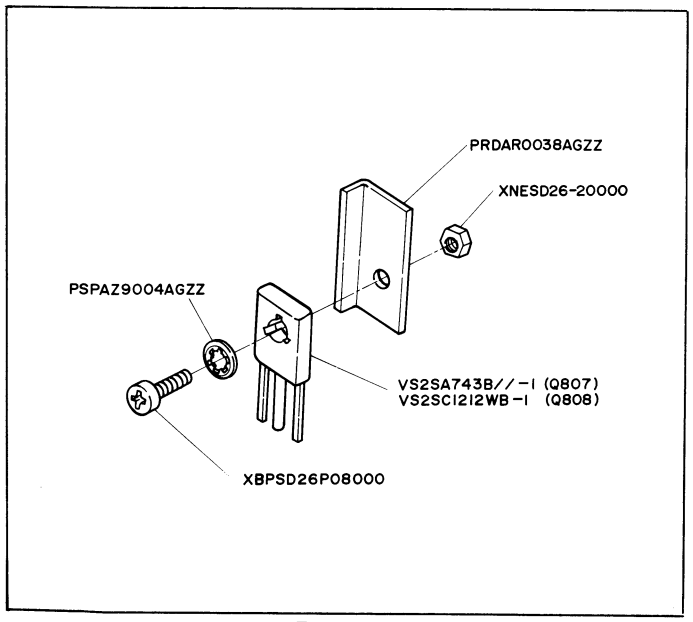


Figure 10

DRIVER TRANSISTOR REPLACEMENT

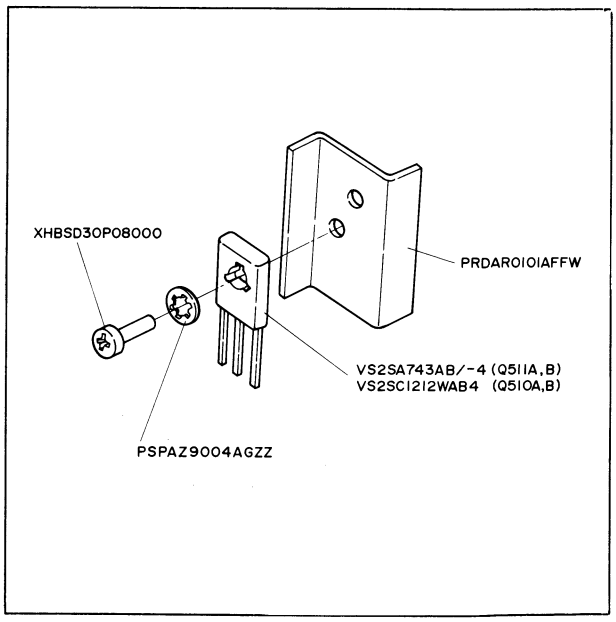


Figure 11

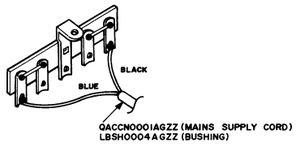
TROUBLE SHOOTING GUIDE

ALL OPERATIONAL MODES (1)

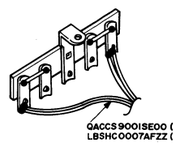
SYMPTOM	SYMPTOM	PROBABLE CAUSE	WHAT TO DO OR CHECK POINT
NO SOUND ALL MODES	AC POWER OK	BROKEN OR SHORTED SPEAKER CORD NETWORK OR VOICE COIL	CHECK CONTINUITY OF SPEAKER CORD, AND VOICE COIL REPAIR BROKEN CORD OR REPLACE SPEAKER
	NORMAL AT DC DETECTED	NOT OPERATE RELAY	CHECK RELAY, Q801 ~ Q806 AND VOLTAGE AT Q806 (EMITTER)
	DEFECTIVE DC DETECTED	DEFECTIVE MAIN SUPPLY AMPLIFIER	REFER TO NEXT
	NO AC POWER, PILOT INDICATOR IS OFF	NO POWER AT WALL SOCKET	
		DEFECTIVE ON-OFF SWITCH OR LINE CORD	
		LOOSE AC PLUG CONTACT	
		BLOWN FUSE	IF THE FUSE BLOWS AS SOON AS IT IS REPLACED
		SHORTED POWER TRANSFORMER SHORTED CAPACITOR	T901 C902, C901
		SHORTED POWER TRANSISTOR	Q901 ~ Q904 CHECK CONTINUITY BETWEEN THE COLLECTOR AND EMITTER, IF IT IS 0 OHM OR CLOSE TO 0 OHM, IT IS DEFECTIVE
		SHORTED POWER SUPPLY CIRCUIT OF POWER AMPLIFIER	CHECK CONTINUITY OF POWER SUPPLY CIRCUIT
		BROKEN PRIMARY WINDING OF POWER TRANSFORMER	CHECK CONTINUITY OF TRANSFORMER
	POWER INDICATOR IS ON, BUT NO SOUND	DEFECTIVE POWER SUPPLY CIRCUIT	DIVERGENCE OF VOLTAGE SPECIFIED IN "SCHEMATIC DIAGRAM"
		BLOWN FUSE	IF THE FUSE BLOWS AS SOON AS IT IS REPLACED
		DEFECTIVE OR SHORTED POWER TRANSISTOR	Q901 ~ Q904
		DEFECTIVE OR SHORTED DEVICE AT OUTPUT	SPEAKER SYSTEM, HEADPHONE
		DEFECTIVE AUDIO AMPLIFIER	DIVERGENCE OF VOLTAGE SPECIFIED IN "SCHEMATIC DIAGRAM"
		DEFECTIVE TRANSISTOR	Q501A (B) ~ Q511A (B)
WEAK SOUND ALL MODES		LOW AC SUPPLY VOLTAGE	CHECK THE VOLTAGE SELECTOR (REAR)
		DEFECTIVE POWER CIRCUIT	DIVERGENCE OF VOLTAGE SPECIFIED IN "SCHEMATIC DIAGRAM"
NO SOUND AT ONE MODE	AT AUX, TUNER	DEFECTIVE FUNCTION SWITCH OR SOCKET	SW301A, B, C, SO904A (B), SO905A (B)
	AT PHONO-1 OR PHONO-2	DEFECTIVE EQUALIZER AMPLIFIER	DIVERGENCE OF VOLTAGE SPECIFIED IN "SCHEMATIC DIAGRAM"
		DEFECTIVE FUNCTION SWITCH, IMP SWITCH, ATT SWITCH OR SOCKET	SW301A, B, C, SW903, SW904, SO906A (B), SO907A (B)
	AT TAPE MODE	DEFECTIVE TAPE SWITCH OR SOCKET	SW408A (B), SO902A (B), SO903A (B)

ALL OPERATIONAL MODES (2)

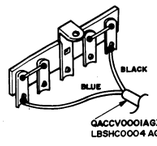
SYMPTOM	SYMPTOM	PROBABLE CAUSE	WHAT TO DO OR CHECK POINT
DISTORTION IN ALL MODES OF OPERATION	REPLACE SPEAKER AND OK	DEFECTIVE VOICE COIL, CONE OR DAMPER OF SPEAKER	REPLACE SPEAKER
		INSUFFICIENT VOLTAGE OF POWER CIRCUIT	VOLTAGES NOT AS SPECIFIED
	ONE CHANNEL IS OK, OTHER IS DISTORTED	DEFECTIVE AUDIO FREQUENCY CIRCUIT	
		AGING OR WEAK IC OR TRANSISTOR	IC401, Q501A (B) ~ Q511A (B), Q901 ~ Q904
		OPEN OR SHORTS IN NEGATIVE FEEDBACK CIRCUIT	R520A (B), R517A (B), C511A (B), TONE CIRCUIT
HUM IN ALL MODES	HIGH LEVEL OF RIPPLE IN DC SOURCE	DEFECTIVE CONSTANT VOLTAGE CIRCUIT	L801, L802, ZD801, ZD802
	RIPPLE IN POWER SUPPLY CIRCUIT OF PREAMPLIFIER	DEFECTIVE CONSTANT VOLTAGE CIRCUIT	C903, C904
		SHORT CIRCUIT OF EARTH OF POWER AMPLIFIER OR OTHER AUDIO UNIT TO CHASSIS, ESPECIALLY HEADPHONE JACK TO CHASSIS	AF UNIT TO CHASSIS, J901 TO CHASSIS
LOUDNESS CONTOUR SWITCH DOES NOT WORK AT ALL		VOLUME CONTROL IS IN OVER REVOLUTION	NORMAL
		DEFECTIVE LOUDNESS CONTOUR SW404 SWITCH OR CIRCUIT	SW404, C401 ~ C404, R407 ~ R410
CONTROL DOES NOT WORK	BASS CONTROL	DEFECTIVE VR303A (B) OR CIRCUIT	
	TREBLE CONTROL	DEFECTIVE VR304A (B) OR CIRCUIT	
	BALANCE CONTROL	DEFECTIVE VR301A (B) OR CIRCUIT	



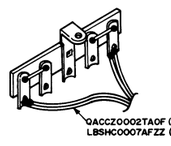
MAINS SUPPLY CORD CONNECTION FOR SEMKO



MAINS SUPPLY CORD CONNECTION FOR SEV



MAINS SUPPLY CORD CONNECTION FOR VDE



MAINS SUPPLY CORD CONNECTION FOR AUDIO PHOTO CLUB

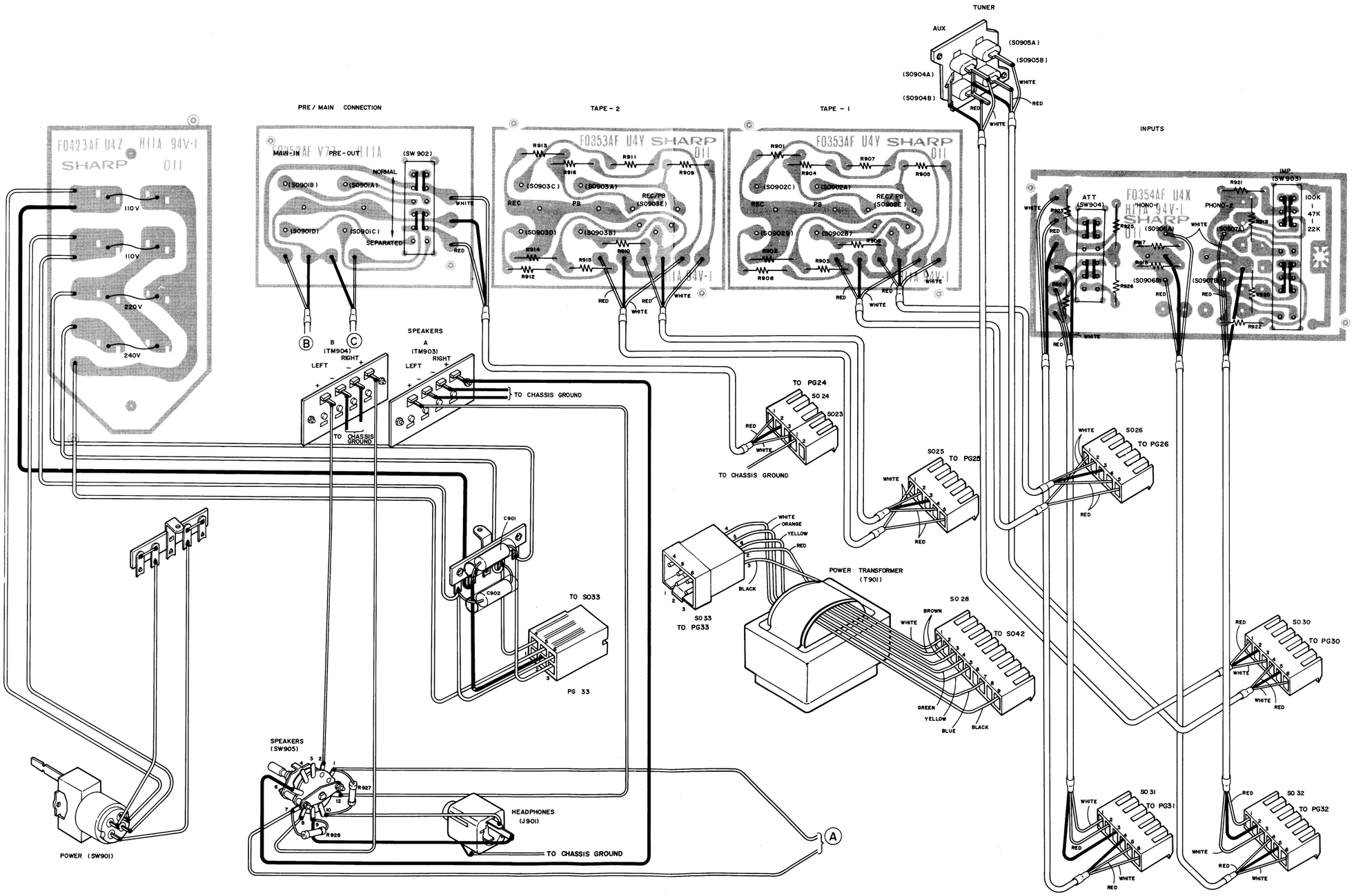


Figure 12 TAPE 1/TAPE 2/PRE MAIN/INPUTS CONNECTION BOARD WIRING SIDE

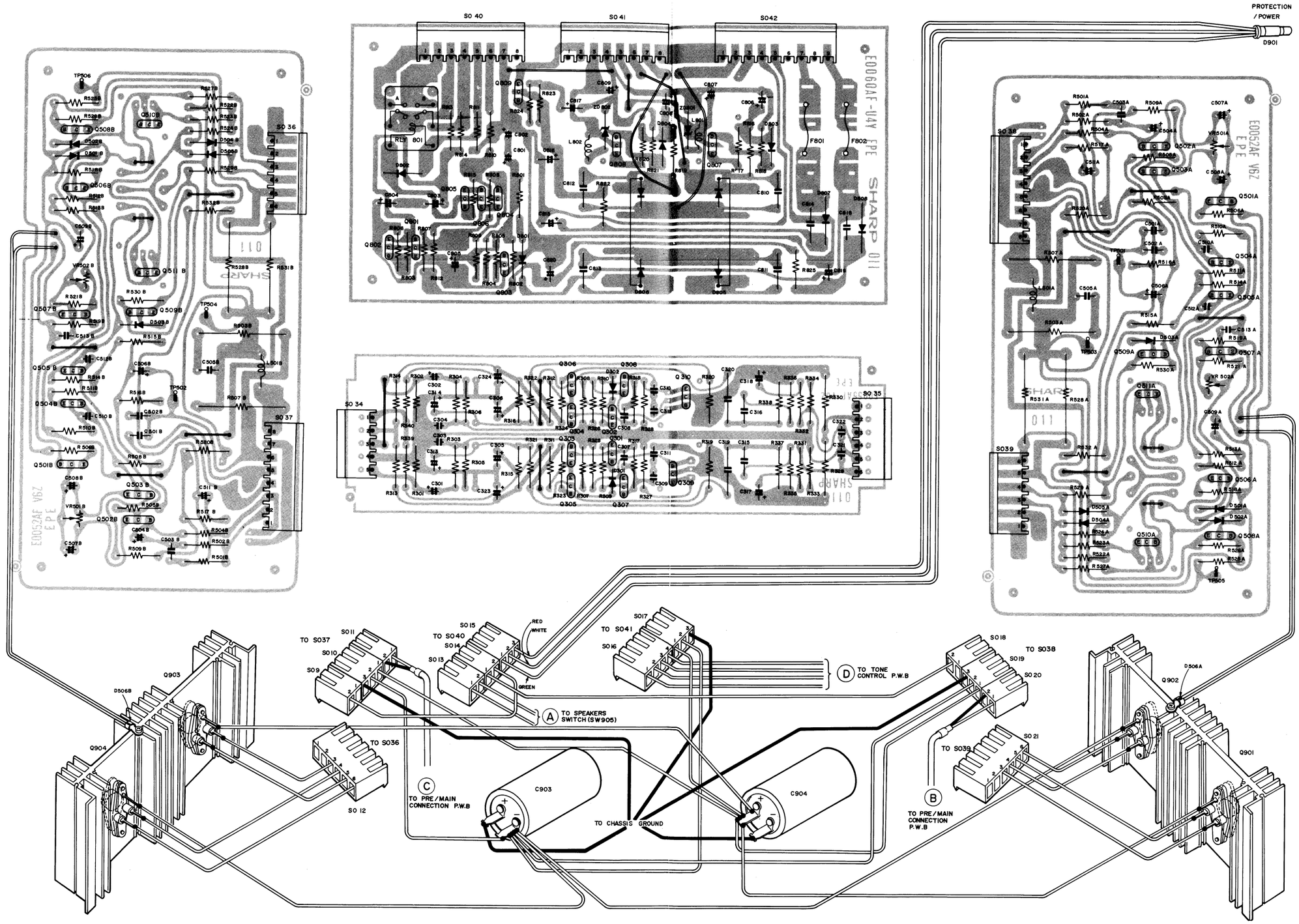


Figure 14 MAIN AMP./EQUALIZER AMP./AC & RELAY UNIT BOARD WIRING SIDE

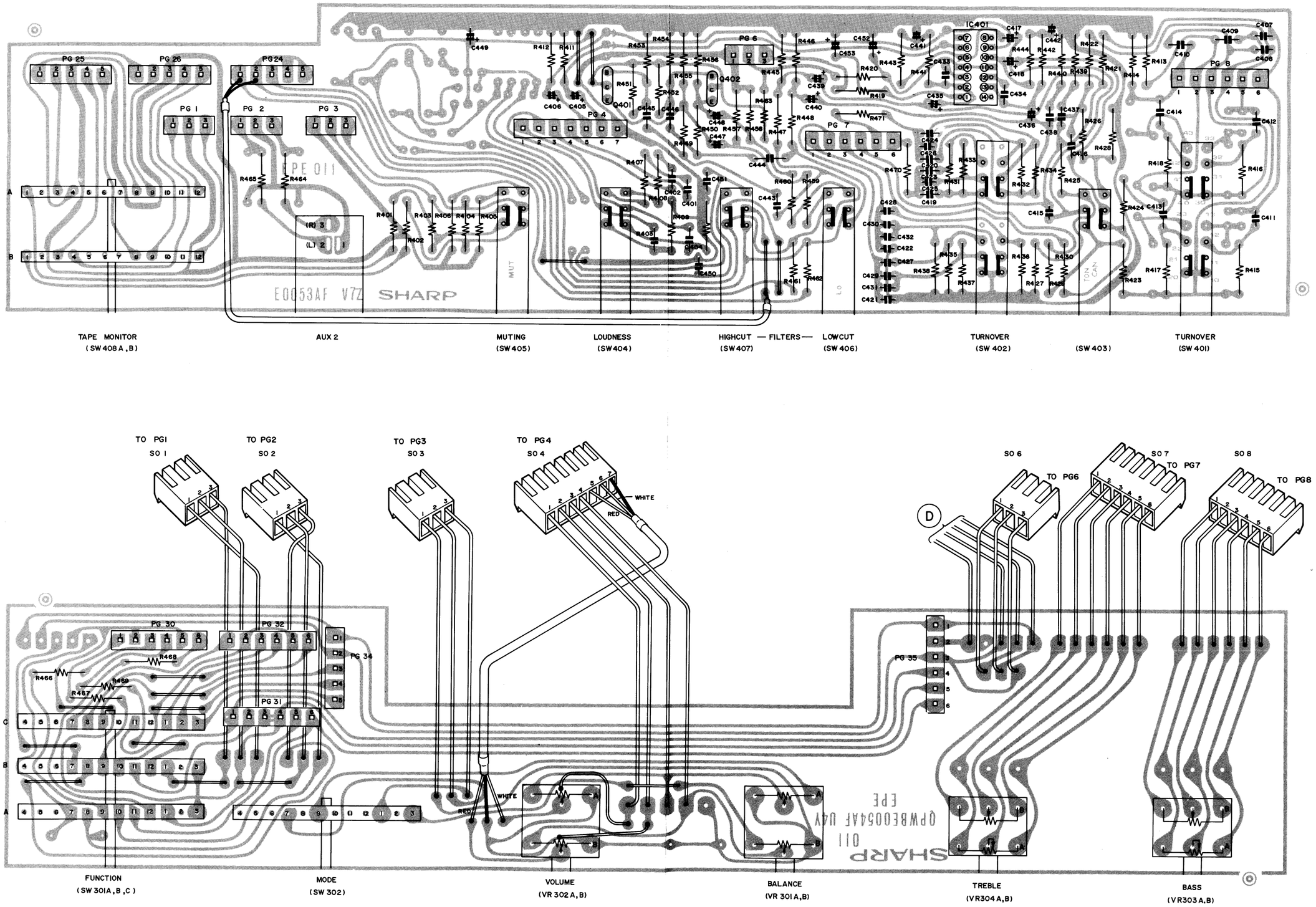
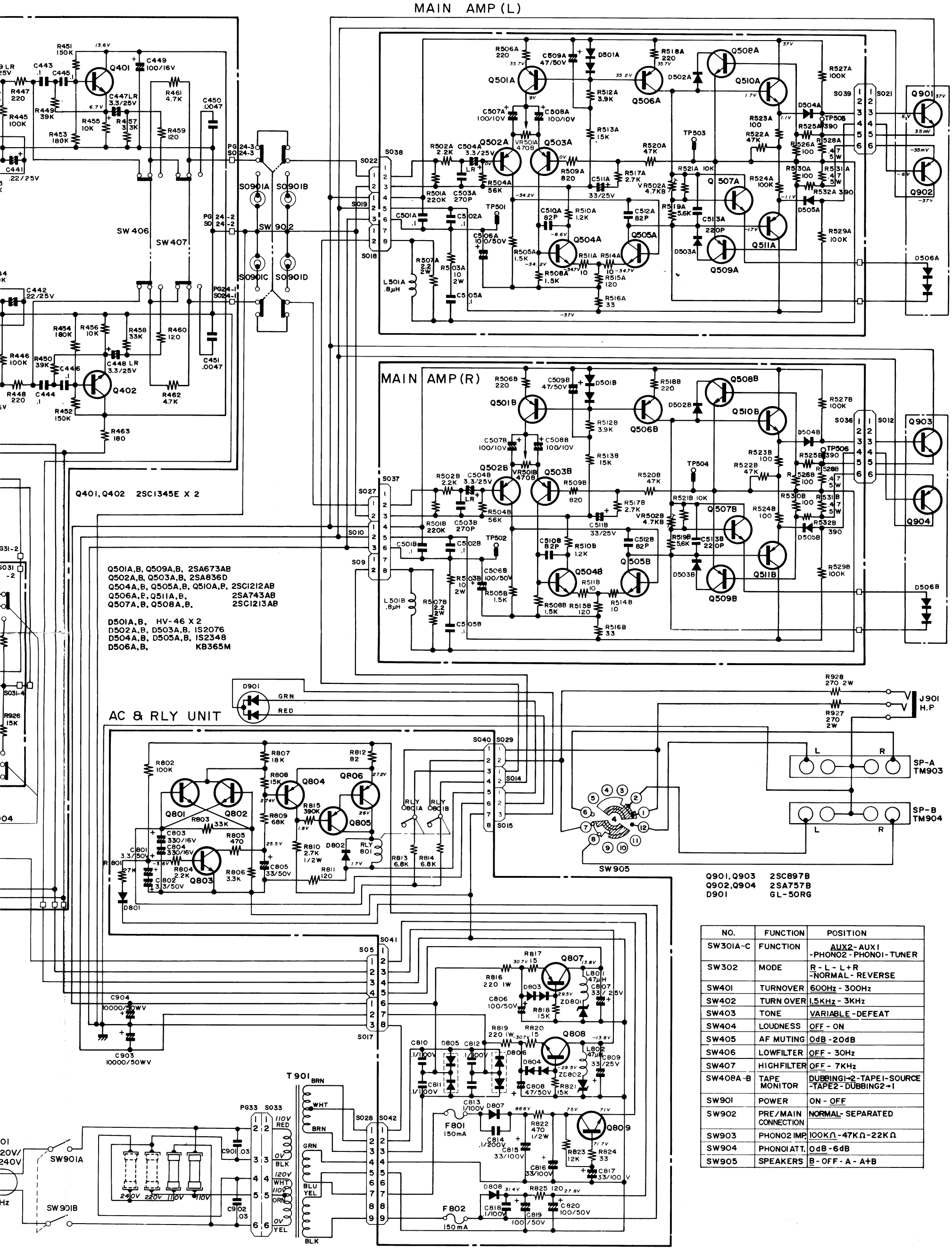
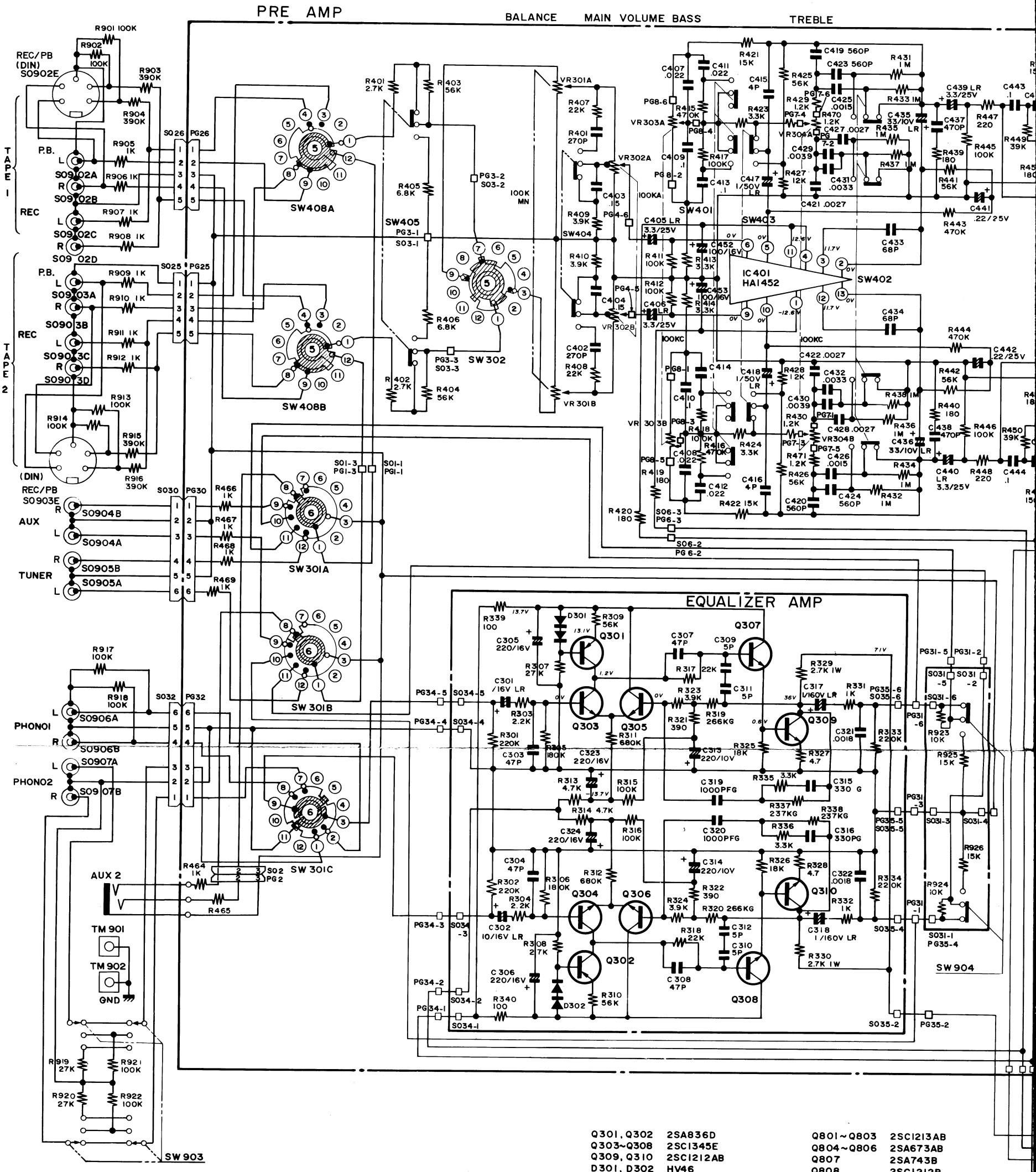


Figure 13 MAIN VOLUME BOARD WIRING SIDE



NO.	FUNCTION	POSITION
SW301A~C	FUNCTION	AUX2-AUX1 -PHONO2-PHONO1-TUNER
SW302	MODE	R-L-L+R -NORMAL-REVERSE
SW401	TURNOVER	600Hz-300Hz
SW402	TURN OVER	1.5KHz-3KHz
SW403	TONE	VARIABLE-DEFEAT
SW404	LOUDNESS	OFF-ON
SW405	AF MUTING	0dB-20dB
SW406	LOWFILTER	OFF-30Hz
SW407	HIGHFILTER	OFF-7KHz
SW408A~B	TAPE MONITOR	DUBBING1→2-TAPE1-SOURCE -TAPE2-DUBBING2→1
SW901	POWER	ON-OFF
SW902	PRE/MAIN CONNECTION	NORMAL-SEPARATED
SW903	PHONO2 IMP.	100KΩ-47KΩ-22KΩ
SW904	PHONO1 ATT.	0dB-6dB
SW905	SPEAKERS	B-OFF-A-A+B

e 15 SCHEMATIC DIAGRAM

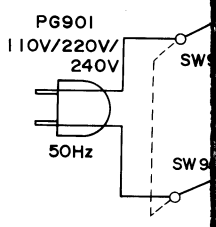


Q301, Q302	2SA836D
Q303~Q308	2SC1345E
Q309, Q310	2SC1212AB
D301, D302	HV46

Q801~Q803	2SC1213AB
Q804~Q806	2SA673AB
Q807	2SA743B
Q808	2SC1212B
Q809	2SC1212AB
D801, D802	1S2076
D803, D804	HV-46
D805	SS-3
D806	SS-3R
D807	1S1887
D808	1S1941
ZD801, ZD802	BZ140

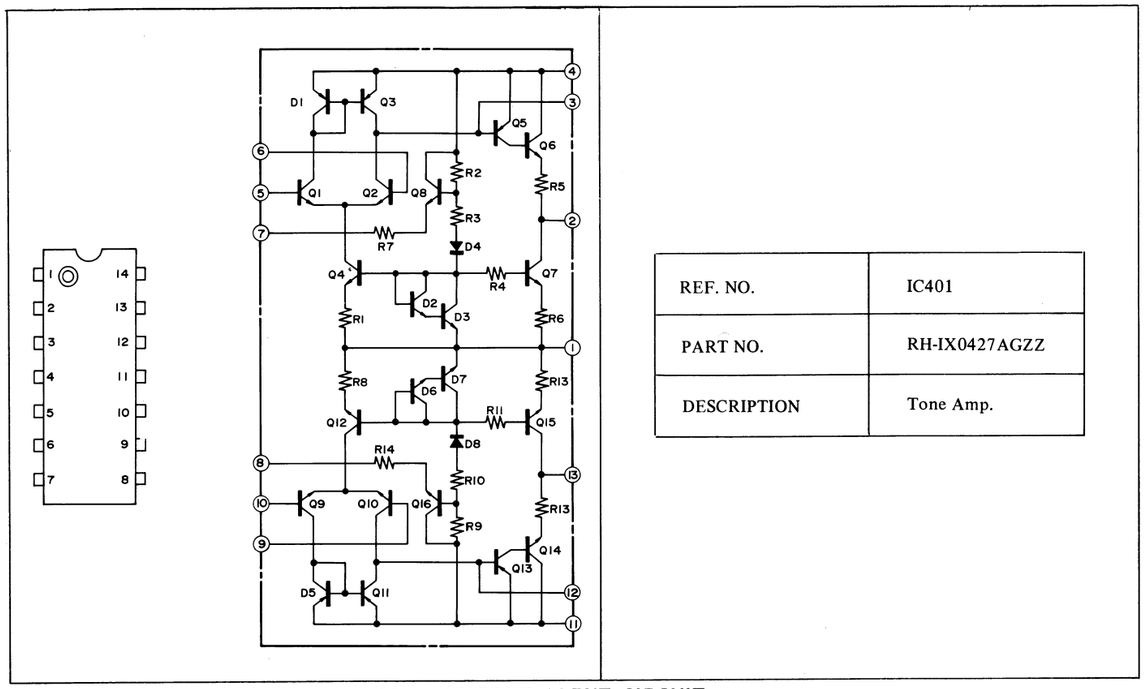
NOTES

1. ALL RESISTORS ARE SHOWN IN OHMS ±5%. K=1000, M=10⁶
2. ALL CAPACITORS ARE SHOWN IN MICROFARADS. P=MMF
3. VOLTAGE READINGS ARE MEASURED WITH VTVM UNDER NO SIGNAL.
4. SWITCHES ARE SHOWN UNDERLINED POSITION.



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 15 SCHEM



REF. NO.	IC401
PART NO.	RH-IX0427AGZZ
DESCRIPTION	Tone Amp.

Figure 16 EQUIVALENT CIRCUIT

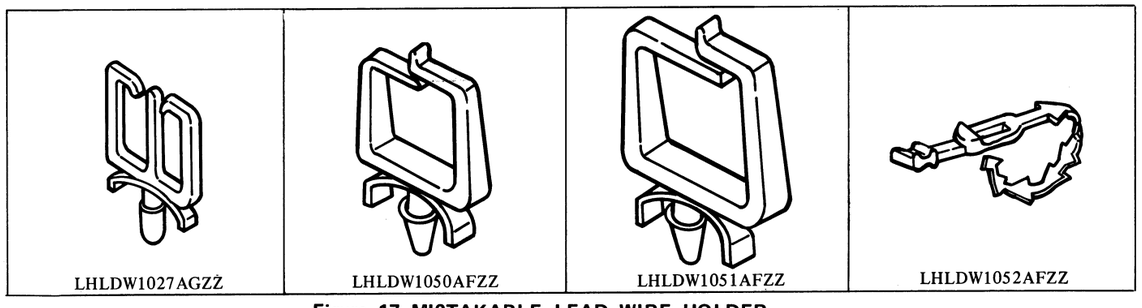
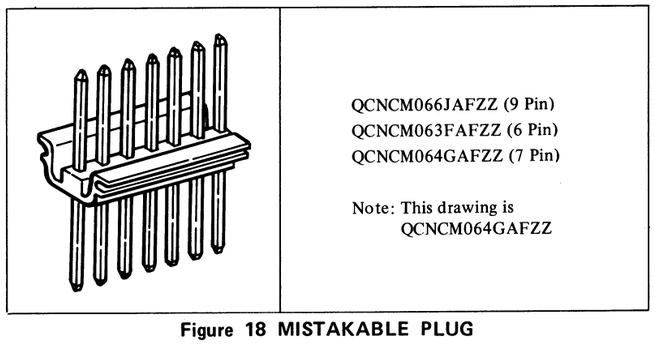


Figure 17 MISTAKABLE LEAD WIRE HOLDER



QCNCM066JAFZZ (9 Pin)
QCNCM063FAFZZ (6 Pin)
QCNCM064GAFZZ (7 Pin)

Note: This drawing is QCNCM064GAFZZ

Figure 18 MISTAKABLE PLUG

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.
1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4. DESCRIPTION

REF. NO.	PART NO.	DESCRIPTION	CODE
	MISCELLANEOUS		
	GCAB-3001AFSA	Cabinet	AZ
	GCOVA1053AFSA	Guide, Lever Switch	AB
	GFTAU3050AFZZ	Plate, Bottom	AN
	GLECP0002SG00	Leg	AD
	HDECW0050AFSB	Board, Right & Left Hand Side	AR
	HPNLC3219AFSA	Plate, Operation	BB
	JKNBN0272AFSA	Knob, VOLUME	AP
	JKNBN0273AFSA	Knob, FUNCTION	AN
	JKNBN0274AFSA	Knob, SPEAKERS/BASS/ TREBLE/BALANCE/ MODE/TAPE MONITOR	AL
	JKNBP0058AFSA	Knob, POWER/TURNOVER/ LOWCUT/HIGHCUT/ LOUDNESS/MUTING	AH
	LANGQ0439AFSA	Bracket, Terminal	AT
	LANGR0350AFZZ	Bracket, Operation Plate	AK
	LANGT0451AFZZ	Bracket, Strengthen, Left & Right Hand Side	AE
	LANGT0452AFZZ	Bracket, Printed Wiring Board	AC
	LANGT0453AFZZ	Bracket,	AC
	LANGT0456AFZZ	Bracket, PHONO Terminal P.W.B.	AB
	LBSHC0004AFZZ	Bushing, Mains Supply Cord	AC
	LBSHC0007AFZZ	Bushing, Mains Supply Cord	AB
	LCHSM0201AFZZ	Plate, Mounting	AR
	LHLDW1027AGZZ	Holder, Lead Wire	AA
	LHLDW1050AFZZ	Holder, Lead Wire	AB
	LHLDW1051AFZZ	Holder, Lead Wire	AB
	LHLDW1052AFZZ	Holder, Lead Wire	AA
	LHLDW9003CEZZ	Holder, Lead Wire	AA
	LHLDZ9050AF00	Holder, LED	AV
	LX-NZ3030SEFN	Nut, Headphones/AUX 2 Jack	AA
	LX-WZ3017CEFN	Washer, GND Terminal	AA
	PCOVS3050AF00	Cover, Shield, Front	AP
	PCOVS3051AF00	Cover, Shield, Rear	AM
	PCOVS3052AFZZ	Bracket, Partition, Power Switch	AD
	PCOVW3101AFZZ	Cover, Fuse Holder, Acrylic	AF
	PRDAR0038AGZZ	Heatsink, Small, Transistor (Q807, Q808)	AA
	PRDAR0100AF00	Heatsink, Large, Power Transistor	AW
	PRDAR0101AFFW	Heatsink, Small, Transistor	AB
	PSHEF0048AG00	Felt, Cabinet	AA
	PSHEF0110AFZZ	Felt, Masking, Lever Switch	AA
	PSPAN0004AF09	Spacer, Headphone Jack, AUX 2 Jack	AB
	PSPAP0012AGZZ	Washer, Headphone Jack, AUX 2 Jack	AA
	PSPAZ0050AFZZ	Insulator, Power Transistor	AB
	PSPAZ9004AGZZ	Washer, Retaining, Transistor	AA
	PZETF0101AFZZ	Insulator, Partition	AA
	QACCN0001AGZZ	Cord, Mains Supply	AP
	QACCS9001SE00	Cord, Mains Supply	AG
	QACCV0001AGZZ	Cord, Mains Supply	AN
	QACCZ0002TA0F	Cord, Mains Supply	AG
PG1, PG2, PG3, PG6	QCNCM051CAFZZ	Plug, 3 Pin	AC
PG24, PG25, PG26	QCNCM053EAFZZ	Plug, 5 Pin	AD
PG7, PG8, PG(30 ~ 32), PG4	QCNCM054FAFZZ	Plug, 6 Pin	AD
	QCNCM055GAFZZ	Plug, 7 Pin	AE
	QCNCM063FAFZZ	Plug, 6 Pin	AF
	QCNCM064GAFZZ	Plug, 7 Pin	AG
	QCNCM066JAFZZ	Plug, 9 Pin	AH
PG34	QCNCM073EAFZZ	Plug, 5 Pin	AC
PG35	QCNCM074FAFZZ	Plug, 6 Pin	AC
SO9, SO11, SO13, SO14, SO18, SO20, SO23	QCNCW050PAFZZ	Socket, 2 Pin	AC
SO1, SO2, SO3, SO6, SO10, SO15, SO17, SO19	QCNCW051CAFZZ	Socket, 3 Pin	AC
SO16	QCNCW052DAFZZ	Socket, 4 Pin	AC
SO25, SO26	QCNCW053EAFZZ	Socket, 5 Pin	AC
SO7, SO8, SO12, SO21, SO30, SO31, SO32	QCNCW054FAFZZ	Socket, 6 Pin	AC
SO4	QCNCW055GAFZZ	Socket, 7 Pin	AC
SO36, SO39, SO37,	QCNCW063FAFZZ	Socket, 6 Pin	AE
SO38, SO40, SO41	QCNCW065HAFZZ	Socket, 8 Pin	AF

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
SO42	QCNCW066JAFZZ	Socket, 9 Pin	AF
SO34	QCNCW071EAFZZ	Socket, 5 Pin	AE
SO35	QCNCW072FAFZZ	Socket, 6 Pin	AE
	QCNCW080FAFZZ	Socket,	AC
F801, F802	QFS-D161AAGNI	Fuse, 160mA	AE
	QFS-C252CAGNI	Fuse, 2.5A, RATED LINE VOLTAGE	AE
	QFSHD1001AGZZ	Holder, Fuse	AB
	QHWS-3001AGFN		AA
J902	QJAKZ0021AGZZ	Jack, AUX 2	AH
J901	QJAKE0027AGZZ	Jack, HEADPHONES	AF
	QLUGL0411CEZZ	Lug Terminal, 4 Pin	AC
	QLUGP0105AGZZ	Lug Terminal, Test Point	AA
	QLUGP0111CEFW	Lug Terminal	AA
	QPLGA0205AGZZ	Plug, Mains Supply Cord	AK
	QPLGS0150AFZZ	Plug, Short Circuit, PHONO 1/ PHONO 2	AC
	QPWBE0052AFZZ	Printed Wiring Board, Power Amp.	AM
	QPWBE0053AFZZ	Printed Wiring Board, TONE Amp.	AP
	QPWBE0054AFZZ	Printed Wiring Board, Volume	AN
	QPWBE0055AFZZ	Printed Wiring Board, Equalizer	AH
	QPWBE0060AFZZ	Printed Wiring Board, Power Supply	AL
	QPWBF0352AFZZ	Printed Wiring Board, PRE/ MAIN CONNECTION	AD
	QPWBF0353AFZZ	Printed Wiring Board, TAPE-1/ TAPE-2	AD
	QPWBF0354AFZZ	Printed Wiring Board, IMP./ PHONO-2/PHONO-1/ATT	AD
	QPWBF0423AFZZ	Printed Wiring Board, Fuse	AD
SO901, SO906, SO907	QSOCJ2450AFZZ	Socket, PRE/MAIN CONNECTION, PHONO-1/ PHONO-2	AG
SO904, SO905	QSOCJ2451AFZZ	Socket, TUNER/AUX	AG
	QSOCT2350AFZZ	Socket, Power Transistor	AD
SO902, SO903	QSOCZ2450AFZZ	Socket, TAPE-1/TAPE-2	AK
SW401	QSW-B0050AFZZ	Switch, TURNOVER, 300Hz/600Hz	AL
SW402	QSW-B0050AFZZ	Switch, TURNOVER, 1.5kHz/3kHz	AL
SW403	QSW-B0051AFZZ	Switch, VARIABLE/DEFEAT	AK
SW404	QSW-B0051AFZZ	Switch, LOUDNESS	AK
SW405	QSW-B0051AFZZ	Switch, MUTING	AK
SW406	QSW-B0051AFZZ	Switch, LOWCUT	AK
SW407	QSW-B0051AFZZ	Switch, HIGHCUT	AK
SW901	QSW-B9059AFZZ	Switch, POWER	AK
SW302	QSW-R0101AFZZ	Switch, MODE	AN
SW408 (A, B)	QSW-R0102AFZZ	Switch, TAPE MONITOR	AS
SW905	QSW-R0104AFZZ	Switch, SPEAKERS	AL
SW301 (A, B, C)	QSW-R0117AFZZ	Switch, FUNCTION	AK
SW902	QSW-S0150AFSA	Switch, NORMAL/ SEPARATED	AF
SW904	QSW-S0150AFSA	Switch, ATT	AF
SW903	QSW-S0151AFSA	Switch, IMP	AG
TM901, TM902	QTANZ0150AFSA	Terminal, GND	AD
TM903, TM904	QTANZ0450AFZZ	Terminal, SPEAKERS	AN
	XWHG081-05125	Washer, Rubber Headphone Jack	AA
	QTIPZ0050AFZZ	Tip, Socket, Small	AA
	QTIPZ0052AFZZ	Tip, Socket, Large	AA

CAPACITORS

C441, C442	VCAAAU1EB224K	.22MFD, 25V, +10 −10%, Aluminum Electrolytic	AC
C901, C902	VCP0AT3AC333M	.033MFD, 1000V, +20 −20%, Oil	AE
C903, C904	VCEABD1HB109M	10000MFD, 50V, +20 −20%, Electrolytic	AX

RESISTORS

R319, R320	RR-NZ0006AFZZ		AD
R337, R338	RR-NZ0007AFZZ		AD
R822	VRC-MT2HG471K	470 ohm, 1/2W, +10 −10%, Solid	AA
R810	VRC-MT2HG272K	2.7K ohm, 1/2W, +10 −10%, Solid	AA
R816, R819	VRS-PT3AB221K	220 ohm, 1W, +10 −10%, Oxide Film	AB
R329, R330	VRS-PT3AB272K	2.7K ohm, 1W, +10 −10%, Oxide Film	AB
R927, R928	VRS-PT3DB271K	270 ohm, 2W, +10 −10%, Oxide Film	AB
R503 (A, B)	VRW-KT3DD100K	10 ohm, 2W, +10 −10%, Wire Wound	AC
R507 (A, B)	VRW-KT3DD2R2K	2.2 ohm, 2W, +10 −10%, Wire Wound	AC
R528 (A, B) R531 (A, B)	VRW-KT3HDR47K	.47 ohm, 5W, +10 −10%, Wire Wound	AD

CONTROLS

VR301 (A, B)	RVR-C0004AGZZ	BALANCE	AL
VR302 (A, B)	RVR-B0114AFZZ	VOLUME	AL
VR303 (A, B)	RVR-C0050AFZZ	BASS	AL
VR304 (A, B)	RVR-C0050AFZZ	TREBLE	AL
VR502 (A, B)	RVR-M0065AGZZ	Idle Current Adjust	AF
VR501 (A, B)	RVR-M0072AGZZ	Center Voltage Adjust	AG

TRANSISTORS

Q301, Q302	VS2SA836-D/-1	Equalizer, Constant Current Circuit	AE
Q303, Q304	VS2SC1345-E-1	Equalizer, Differential Amp.	AE
Q305, Q306	VS2SC1345-E-1	Equalizer, Differential Amp.	AE
Q307, Q308	VS2SC1345-E-1	Equalizer, Emitter Follower Circuit	AE
Q309, Q310	VS2SC1212WAB4	Equalizer, Class "A" Amp.	AH
Q401, Q402	VS2SC1345-E-1	Lowcut Filter, Emitter Follower Circuit	AE
Q501 (A, B)	VS2SA673AB/-1	Power Amp, Constant Current Circuit	AG
Q502 (A, B)	VS2SA836-D/-1	Power Amp, Differential Amp., 1st	AE
Q503 (A, B)	VS2SA836-D/-1	Power Amp, Differential Amp., 1st	AE
Q504 (A, B)	VS2SC1212WAB4	Power Amp., Differential Amp., 2nd	AH
Q505 (A, B)	VS2SC1212WAB4	Power Amp., Differential Amp., 2nd	AH
Q506 (A, B)	VS2SA743AB/-4	Power Amp., Constant Current Circuit	AL
Q507 (A, B)	VS2SC1213AE-1	Power Amp., Bias Circuit	AF
Q508 (A, B)	VS2SC1213AB-1	Power Amp., Voltage Detector	AF
Q509 (A, B)	VS2SA673AB/-1	Power Amp., Voltage Detector	AG
Q510 (A, B)	VS2SC1213WAB4	Power Amp., Driver Amp.	AH
Q511 (A, B)	VS2SA743AB/-4	Power Amp., Driver Amp.	AL
Q801, Q802	VS2SC1213AB-1	Protection Circuit, Speaker Output	AF
Q803	VS2SC1213AB-1	Protection Circuit, Power Off	AF
Q804	VS2SA673AB/-1	Protection Circuit, Switching	AG
Q805	VS2SA673AB/-1	Protection Circuit, Switching	AG
Q806	VS2SA673AB/-1	Protection Circuit, Switching	AG
Q807	VS2SA743B//-1	Mains Supply Circuit, Ripple Filter	AK
Q808	VS2SC1212WB-1	Mains Supply Circuit, Ripple Filter	AH
Q809	VS2SC1212WAB4	Mains Supply Circuit, Ripple Filter	AH
Q901, Q903	VS2SC897-B/-1	Power Amp.	AR
Q902, Q904	VS2SA757-B/-1	Power Amp.	AT

DIODES

D301, D302	VHVHV46-G//-1	Equalizer, Constant Current Circuit	AD
D501 (A, B)	VHVHV46-G//-1	Constant Current Circuit	AD
D502 (A, B)	VHD1S2076//-1	Voltage Detector	AG
D503 (A, B)	VHD1S2076//-1	Voltage Detector	AG
D504 (A, B)	VHD1S2348-H-1	Spike-less Amp.	AD
D505 (A, B)	VHD1S2348-H-1	Spike-less Amp.	AD
D506 (A, B)	VHVMV203Y//-1	Bias Circuit	AD
D801	VHD1S2076//-1	Detector	AG
D802	VHD1S2076//-1	Surge Current Provention	AG
D803, D804	VHVHV46-G//-1	Ripple Filter Circuit	AD
D805	VHDSS-3////-F	Rectifier	AM
D806	VHDSS-3R///-F	Rectifier	AM
D807	VHD1S1887//-1	Rectifier	AD
D808	VHD1S1941//-1	Rectifier	AD
ZD801, ZD802	VHEBZ140///-1	Ripple Filter Circuit	AG
D901	VHPGL50RG//-1	Indicator	AE

COILS

L501 (A, B)	RCILZ0050AFZZ	.8μH	AD
L801, L802	VP-LH470M0000	47μH	AB

TRANSFORMER

T901	RTRNP0395AFZZ	Power	BP

INTEGRATED CIRCUIT

IC401	RH-IX0427AGZZ	Tone Amp.	AP

RELAY

REY 801 (A, B)	RRLYZ0050AFZZ		AW

A2500-1.5MNK
Printed in Japan